Ferry Operators' Perception on Influencing Factors of Ferry services in Lagos, Nigeria

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Abstract:- Ferry operations and services are comprised of constituent factors that might be either simple or complex, depending on how they are regarded. Population density, frequency of service, fare, weather, operating cost and time, safety and cleanliness, and so on all play a role. This study aims to assess the factors which influence ferry operations and services in Lagos State with specific objectives to assess the socio-economic characteristics of the ferry operators; determine the level of supply of ferry by the operators; and identify the influencing factors of ferry ridership from Operators' perspective. Primary and secondary data were source. However, a survey design method was deployed and used for the study. Trip survey was done daily; involved morning and evening traffic between 6:30 a.m. and 6:00 p.m. For boat/ferry operators, the sample size was 111. The data was analyzed using inferential and descriptive statistics; processed data from questionnaire results was evaluated hypothetically using the Pearson Chi-Square rule. The levels or ratings of supply factors were determined using a Likert rating scale. it was revealed that Ferry ridership is heavily influenced by operating time. Hypothesis tested revealed that ridership Fare does not have associative influence of the number of trips by the operators. The study concluded that supply determinants of ferry ridership and services contribute immensely to the level of ferry patronage and provisions. There is need to monitor irregularities that may crawl-into management and sustainability of water transport development in Lagos State and Nigeria as a whole.

Key-words: ferry, service, inland, waterway, determinant, factors, operators, ridership

1   Introduction

An important factor in the socioeconomic growth of countries and regions is the transportation industry. Because of its affordability, efficacy, social acceptability, safety, and environmental friendliness, the transportation sector is strongly associated with and significantly impacts other economic sectors. [1]. Any responsible government must anchor its growth and development efforts on the transformational wheel of transportation if it is to manage government, commercial, and non-governmental institutions effectively [2]. The revitalization of inland water transportation services, which for a very long time seemed to have been grounded in Lagos State despite the fact that more than 60% of Lagos is covered by water, is one of the most prominent solutions to the transportation problem in Lagos state [3]. Nigeria's largest and most complicated urban area is the Lagos metropolitan area. Lagos, one of the largest cities in the world with over 18 million residents, is growing at a rate of about 6% annually. More than 45% of the nation's skilled labourers are employed there, and it boasts the largest manufacturing sector [4]. The city has a high proportion of traffic congestion as a result of insufficient transportation infrastructure expansion throughout the years to accommodate the city's rising population. Traveling within Lagos takes twice as long, and sometimes three times as long, which has a negative impact on quality of life and economic growth. Diversifying Lagos' transportation options is essential for resolving this issue, as is encouraging passengers to use alternative modes of transit.

Transportation services are ineffective without passenger patronage; thus, passengers' interests must be earned as active partners in the transportation sector [5]. The act or occurrence of making a decision, according to the English definition. In this context, determining factors are factors that influence making the correct decision. Every potential passenger is critical in making this selection since something has to trigger the consumer's choice before demands are made. Similarly, for transportation operators, ridership in terms of service supply can be determined by several elements surrounding transportation operations. Transport or transportation is the movement of people, animals and goods from one location to another. Air, rail, road, sea, cable, pipeline, and space travel are all modes of transportation. Transport is vital because it allows people to trade with one another, which is necessary for civilizations to grow [6]. Rodrigue believes that transportation is necessary for growth and globalization, but that most modes

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pollute the air and occupy up a lot of space. While government subsidies are substantial, good transportation planning is critical to maintaining traffic flow and limiting urban development" [7]. Ndikom also expounded that ferry service plays a vital role in economic development, especially for remote riverine areas and continued that it has a propensity to relieve the pressure on a country road and rail transport infrastructure [8]

One of the studies that is connected to this one is Taylor and Fink, who said that the body of research explaining transit ridership is shockingly inconsistent, sometimes ill-conceived, and sometimes yields confusing or contradicting results [9]. Their goal is to review the literature on transit ridership, critique, sometimes significant flaws in previous studies, draw conclusions from more rigorous studies on the factors that most influence transit use, and make recommendations on how to better understand and explain transit ridership. [10] Chorley believed that

"water is viewed as a highly variable and mobile resource in the broadest sense." Water is by far the most important, familiar, and magnificent of all the substances required for life as we know it on Earth. "Water transport is the most cost-effective mode of transportation for bulk goods." It allows governments to lower transportation costs for bulk imports and exports. It could play a vital role in unlocking the economic potential, and increasing competitiveness and integration of countries that share waterways such as the Nile" [1].

2 Study Area

This study geographical area is situated inside the Lagos metropolitan area; as figure 1 and 2 illustrate, canal routes that cross the marinas in Apapa and Ikorodu are all part of the Lagos state metropolitan area. The analysis took into account the ferry operators along these routes.

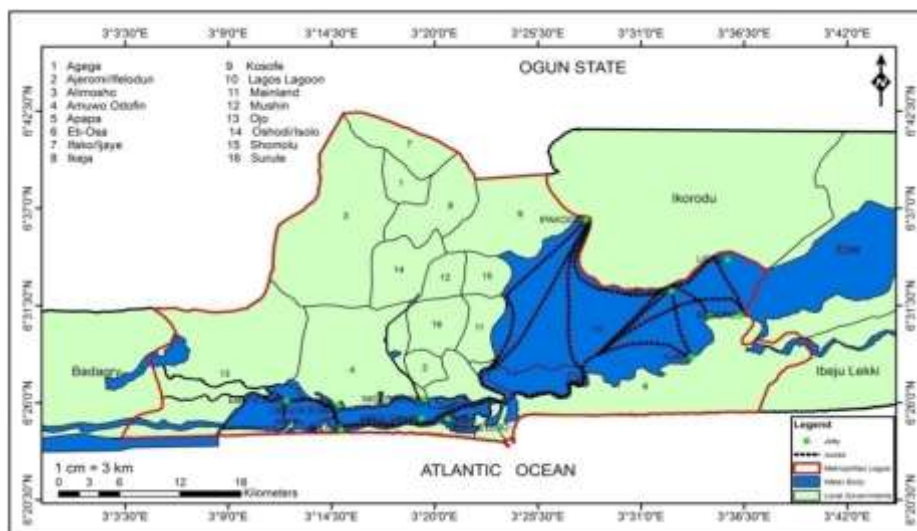Figure 1: Administrative Map of Lagos State showing Metropolitan Area of Lagos;
Source: [11]

Figure 2: Map showing the area of coverage for the study
(Lagos Metropolitan Area) Source: [12]

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Lagos has long been known as one of Nigeria's most industrialized areas, with a concentration of major and medium-sized enterprises. Lagos' transportation services have expanded and improved in order to meet the city's growing population and expectations. There are suburban railways and ferry services. [13]. Lagos State Ferry Services Corporation operates and operates on some regular routes, such as those between Lagos Island and the mainland.

3 Method

The study's objectives were addressed through the use of survey design. In order to get information from respondents, a questionnaire was used in this process. Interviews with Ferry employees were conducted using a questionnaire and focus groups. The whole fleet of ferries using these waterways—Marina-Apapa and Marina-Ikorodu—was included in the study. The questionnaire was designed to cover a number of topics, including the socioeconomic characteristics of the ferry staff, the cooperating operators' ferry supply, the amount of ferry patronage along the marina to apapa, the number of trips from the marina to Ikorodu, and an analysis of the factors that influence ferry service. Direct observation was used to conduct a daily trip survey between the hours of 6 a.m. and 6 p.m. Additionally, passenger manifests were gathered for in-depth examination. A Likert rating scale was employed to ascertain the characteristics that influence ferry service, while considering the opinions of the ferry operators as viewed. Regression analysis was used to determine the degree to which ferry services influence one another and services from the operators' point of view.

Table 1: Passengers Manifest for the study

Route	Number of Commuters	Average commuters per day
Marina to Apapa	1290-1400	1345
Ikorodu to five cowries ferry terminal	1380–1275	1215
Marina to Ikorodu	1725-15890	1601
TOTAL		4,161

Sources: National Inland Waterways Authority, 2022

4 Results and Discussion

4.1 Socio-economic characteristics of ferry users in the study area

The percentage of genders utilizing Lagos State's water transportation services is closely compared in Table 2. All passengers on each boat that was sampled along the way were given a questionnaire, which was used to collect this data. On the other hand, 46.3% of passengers were women and 53.7% of passengers were men. The results show that 183 (53.7%) of the boat's passengers are either married or living together. 19 respondents (5.6%) are widows, compared to 34.6% of single respondents. Divorces accounted for 21 (6.2%) of the population, according to the statistics. This data indicates that the Lagos Metropolitan area's water transport services are used by married persons, especially men. Differences in the age groupings of boat operators were discovered by the study. The age range of 30.8% of responders is 18 to 30. Of the boat passengers questioned, 48.4% are between the ages of 31 and 40. 51–60 years old makes up 15.5% and 41–50 years old, respectively. When running a transportation service, age distribution is an important consideration. People between the ages of 31 and 50 actively use water transportation services, according to the research. The study found that of the sample boat population of passengers, 39.6% were traders, 17.6% were artisans, 21.7 were public servants, 1.5% were farmers, and 12 (3.5%) were passenger responses. Among the other occupational categories indicated in the questionnaire responses are bankers, sailors, students, and corporate personnel; together they represent 60 of their population and 17.6% of all boat passengers questioned. These statistics suggest that the majority of passengers (users) that use the water transport services in the research region are traders and civil servants. Additionally, 60 respondents (17.6%) who are boat passengers in the sample are company workers and students. Many of the travelers have attained higher education and are literate. People thus make decisions and choices with a greater level of judgmental thinking. Economics and the capacity for making decisions are influenced by the quantity of information available regarding acceptable service quality and the possibility of satisfaction with a specific good or service. There are 148 (43.4%) travelers with postsecondary education in the sampled population. At 131 (38.4%), passengers with a secondary education rank second. While 8.8% of the population did not have any formal education, 32 (9.4%) of the sampled passengers held a primary school diploma.

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Table 2: Socio-economic characteristics of ferry users in the study area

Socio-economic characteristics	Freq	%
Gender		
Male	183	53.7
Female	158	46.3
Marital Status of Respondents		
Married/Cohabiting	183	53.7
Divorced	21	6.2
Widow	19	5.6
Single	118	34.6
Age of Respondents		
18-30 years	105	30.8
31-40years	165	48.4
41-50years	20	5.9
51-60years	51	15
Occupation of Respondents		
Trader	135	39.6
Artisan	60	17.6
Civil Servant	74	21.7
Farmer	12	3.5
Others specify	60	17.6
Level of Education		
Primary School	32	9.4
Secondary School	131	38.4
Tertiary	148	43.4
No formal Education	30	8.8
Total	341	100

Source: Author, 2022

According to Table 3, the total number of operational boats supplied by five (5) corporate Operators along the marina to Apapa was thirty-six (36). A break then revealed that thirteen of the passenger boats have a capacity of 15 people, eighteen have a capacity of 16-30 passengers, five have a capacity of 31-50 passengers, and five have a capacity of more than 50 passengers. The combined passenger carrying capacity of cooperating operators is 1035 seats (see equation 1). Hence, the total seat capacity supplied by the operators (individual and corporate organization) are a total of 1,575 seat per day.

From equation 4.1, the capacity supplied by corporate organizations are accounted below;

$$CS = [(13 * 15) + (18 * 30) + (5 * 50) + (1 * 50) \dots\dots\dots\dots (1)$$

$$CS = 540$$

Table 3: Cooperate Operators ferry supplied in Marina to Apapa route

S/n	Names of Cooperate Operators	Fleets size	Used along the route	Less than 15 pax	seats	16-30 pax	seats	31-50 pax	seats	> 50 pax	seats	Total seat supplied
1	Sea coach	15	10	4	60	5	150	1	50	0		260
2	Lag ferry	16	8	2	30	6	180	0	0	0	0	210
3	Texas connection	9	5	2	30	2	60	1	50	0		140
4	Waxi	3	3	3	45	1	30	0		0		75
5	Metro ferry	13	10	2	30	4	120	3	150	1	50	350
Total		56	36	13	195	18	540	5	250	1	50	1035

Source: Author, 2022

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4.2 The level of ferry patronage along Marina to Ikorodu

Table 4.2 depicts the boat voyage from Ikorodu along the marina, which is identical to the Ikorodu to Five Cowries ferry terminal, with 37% making two trips daily, 40% operating 2-4 round trips daily, and 23% operating more than 4 round trips daily. Examine the load factor along the route and keep in mind that, from the marina to Ikorodu, a total of 1035 passenger seats were supplied and used (see table 4) and 1601 seats were used (see table 1).

To calculate the load factor along the route,

$$RPK = Demand\ passenger\ seat * kilometer$$
$$= 1601 * 80 = 128,080$$

$$ASK = supplied\ passenger\ seat * kilometer$$
$$= 1635 * 80 = 130,800$$

Therefore, $Load\ factor = \frac{RPK}{ASK} = \frac{128080}{130,080} = 0.9$

The load factor is the same in the previous route considered that is the boat supplied is under-utilized with less than 1 as the load factor which means that supplied is more than demand.

Table 4: Boat Trips in marina to Ikorodu

Daily number of round trips	Frequency	Percentage	Nautical miles (nm)	Distance (km)	Round trip (km)	Total distance per day (km)
Once per day	0	0	0	0	0	0
Twice per day	20	37%	1.08	2	4	32
2-4 times per day	22	40%	1.08	2	4	40
More than 4 times	13	23%	1.08	2	4	8
Total	55	100%				80

Source: Author, 2022

4.3 Analysis of Influencing Factors of Ferry services

As indicated in table 5, study revealed that there are certain supply factors that influence the service of ferry transport providers in the study area. The fact remains that with and or without these factors, there is likelihood that supply of ferry transport services will face difficulties and severe challenges that can jeopardize the ultimate goal of the operation. Operating/ travel Time as a determinant factor has a strong influence on ferry ridership having scored the highest percentage score of 394 (88.739%) out of aggregate score of 444. Information revealed that ravel time for these operators are usually morning and evening during which travellers/passengers go to work and come from work. This period is seen as peak period when maximum number of trips is made, maximum turnaround time is achieved, huge number of passengers is carried and achievable profits are made. It is an important time for operators to render services to prospective customers.

Operating time can be influenced by weather condition. Unfavourable weather condition has a strong relationship on operators' ferry services irrespective of passenger traffic, schedule time, and status of vessel engine and technologies. Weather was rated second in the rating score with 389 and percentage score of 87.613%. Operators disclosed that weather reports area often disseminated whenever there is harsh weather. During this time, ferries are not allowed to go on transit whenever this information is announced to all operators in the Lagos Metropolitan area. Hence, following the instruction given by weather monitoring department, ferry services are halted from movement until the weather condition is stable. Passenger traffics scored 388 and percentage score of 87.612 in the likert table. The higher the number of passengers demand the higher the number of trips made. Interviews revealed that the rate at which passengers turn out for the demand for ferry services is one of the major factors that influence their frequency of travel and daily operations by ferry operators. Without passenger patronage, services cannot be rendered at any point. Meanwhile, operating/travel time is another factor that determines ferry services and operations.

Number of Daily Trips scored 375(84.460%) out of the total aggregate as shown in table 5. With a percentage score of 84.460%, it was rated 4th among the determinant factors of ferry ridership in the study area. Rate of turn over or number of turnaround time are factors which encourage ferry service provider to continue their operation and this would also facilitate producers' interest to improve the services offered when more profits are achieved in the business. Hence, when the number of daily trips is low, there is tendency for the transport business to wobble and downfall.

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Altitude of Passengers toward ferry accident is rated fifth in Likert rating with a percentage score of 81.757%. Ferry operators interviewed confirmed that passengers' confidence level needed to be boosted in order to have more patronage of water transport services. Most passengers patronising ferry services do not have strong confidence in ferry services due to economic situation of the country coupled with corruption that has crippled the management and safety in transport service and operations.

Other Supply factors as determinant of Ferry ridership are rated from most important to least important as: (1) Operating/ travel Time; (2) Weather; (3) Passenger traffics; (4) Road designs (narrow/shallow waterway); (5) Schedule Time (6) Operating/ travel Time; (7) Condition of Navigation route (8) Operating Cost (Escalating Fuel Cost); (9) Government's stringent policies(10) safety and security (11) Corruption of safety/jetty personnel (12) Low technology level (13) Health Status (Fatigue, drowsiness/dizziness) (14) Altitude of Passengers toward ferry accident. All these factors contribute to transit ridership in terms of supply of services by ferry transport service providers (Operators) in one way and the other.

Table 5: Analysis of Influencing Factors of Ferry services

Determinant of Ferry Ridership	Factor	Strongly Agree Score (Sc) = 4		Agree Score (Sc) = 3		Undecided Score (Sc) = 2		Disagree Score (Sc) = 1		Strongly Disagree Score (Sc) = 0		Aggregate Score =444		Ranking
		(f)	Scores F*Sc	(f)	Scores F*Sc	(f)	Scores F*Sc	(f)	Scores F*Sc	(f)	Scores F*Sc	Total Score	% Score	
Determinant of Supply	Condition of Navigation route	52	376	37	111	15	30	7	7	0	0	356	80.180	7
	Weather	64	256	39	117	8	16	0	0	0	0	389	87.613	2
	Road designs (narrow/shallow waterway)	65	260	18	54	21	42	5	5	2	0	357	80.405	6
	Operating/ travel Time	81	324	10	30	20	40	0	0	0	0	394	88.739	1
	Low technology level	24	96	34	102	31	62	11	11	11	0	271	61.036	12
	Number of Daily Trips	73	292	7	21	31	62	0	0	0	0	375	84.460	4
	Altitude of Passengers toward ferry accident	56		38	114	10	20	5	5	2	0	363	81.757	5
	Safety and security	44	176	27	81	27	54	11	11	2	0	322	72.523	10
	Corruption of safety/jetty personnel	45	180	19	57	14	28	16	16	17	0	281	63.288	11
	Operating Cost (Escalating Fuel Cost)	38	152	40	120	26	52	5	5	2	0	329	74.099	8
	Government's stringent policies	47	188	37	111	11	22	5	5	11	0	326	73.423	9
	Schedule Time	39	156	25	75	23	46	13	13	11	0	290	46.628	14
	Health Status (Fatigue, drowsiness/ dizziness)	36	144	10	30	15	30	27	27	23	0	231	52.027	13
	Passenger traffics	87	348	8	24	7	14	3	3	6	0	389	87.612	3

Source: Author's survey, 2022

Figure 3: Modern Jetty at Ferry Terminal in the study area
Source: Author, 2021

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4.3.1 Regression analysis for Influencing Factors of Ferry services

Table 6 indicates the regression analysis of influencing factors of ferry services from operators' perspective. Following the result of the analysis, the result shows that operating time is the most influencing factor of ferry services in the study area, having a p-value of 7.44E-05. The next most influencing factors were space and comfort (0.0001), and safety and security (0.010). The result shows that income does not have influence on influencing ferry services in the routes under study. The R-square

analysis revealed that 77.7% of the 341 observations fit well into the model that the regression produced, given a standard error margin of 5.967 for the seven independent variables and other variables not included. As a result, the regression's results were satisfactory. Because the p-value for the ANOVA was significantly below the chosen 95% significant level, the analysis of variance revealed that the variables were highly connected.

Table 6: Regression Analysis for Influencing factors of ferry services from operators' perspective

R²	0.777				
Adjusted R²	0.743		n	111	
R	0.867		k	6	
Std. Error	5.967		Dep. Var.	Supply	

ANOVA table

Source	SS	df	MS	F	p-value
Regression	41,386.0562	7	5,566.2462	157.86	2.11E-101
Residual	11,788.9423	104	37.7825		
Total	53,174.9985	111			

Regression output — *confidence interval*

Variables	coefficients	std. error	t (df=104)	p-value	95% lower	95% upper
Intercept	13.1011	1.5979	6.253	5.01E-10	7.8998	13.3402
Operating time	0.7561	0.1821	5.121	7.44E-05	0.5810	1.1778
Weather	0.6284	0.1502	3.176	.0001	0.3350	0.8945
Passenger traffic	0.3723	0.1671	2.276	.0010	0.2101	0.8366
Operating cost (Escalating Fuel Cost)	0.4216	0.1718	2.607	.0162	0.0710	0.7875
Safety and security	0.4456	0.1777	2.491	.0181	0.0588	0.7931
Low level of tech.	0.3390	0.1732	1.394	.2444	-0.0083	0.5666

Source: Author, 2022

4.3.2 Hypothesis Testing

Table 7 shows chi square significant result on Operators' Ridership Fare and Daily Trip of Operators in the study area. The null hypothesis (H$_O$) stated that there is no significant relationship between Ridership Fare and Operators' Daily Trip. The result of hypothesis tested that the value of the chi square statistic is 25.556. The *p*-value in the same row in the "Asymptotic Significance (2-sided)" column is .061. According to Pearson Chi-Square rule, the result is significant if this value is equal to or less than the designated alpha level (normally .05).

In this case, the *p*-value is smaller than the standard alpha value; the null hypothesis is also accepted. The null hypothesis that asserts the two variables are independent of each other is accepted. The result is not *significant. Th*e data suggests that the variables Operators' Ridership Fare (charges) and Operators' Daily Trips are not associated with each other. Ridership Fare does not have associative influence of the number of trips the ferry service providers (operators) make on a daily basis. Hence, Fares charged on passengers do not determine schedule time, operating time, and travel time of operators.

Table 7: Chi-Square Tests on Ridership Fare and Operators' Daily Trip

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	56ᵃ	1	.061
Likelihood Ratio	30.006	1	.018
Linear-by-Linear Association	1.943	1	.163
N of Valid Cases	111		
a. 18 cells (72.0%) have expected count less than 5. The minimum expected count is .04.			

Source: Author, 2022

5 Conclusion and Recommendation

Taking user views into consideration, the study focuses on the determinant factors that affect ferry usage in the Lagos Metropolitan area. The study examined supply variables that affect the ridership operations of ferry service providers as well as demand variables that predict ferry ridership. The study found that a number of supply variables, including as passenger volume, operation and travel hours, weather, safety and security, and health status (fatigue, drowsiness/dizziness), affect the quality of service provided by ferry transport providers in the study area. careless driving on the part of operators, etc. Operating time, which received the highest percentage score of 394 (88.739%) out of a possible 444 points, has a significant impact on ferry ridership. With a score of 389 (87.613%) out of a possible 444, weather was ranked second. Passenger traffic comes next, having received a 3 on the Likert scale. Additionally, the null hypothesis was approved. Acceptance of the null hypothesis results in the two variables being said to be independent of one another. According to the study, there is no correlation between the variables Operators' Daily Trips and Operators' Ridership Fare (charges). Ridership fare has no associated effect on the number of trips made by ferry service providers (operators) each day. As a result, the fares charged to passengers have no bearing on the schedule time, or operating time of the operators. According to the survey, ferry operators indicated that one of the most important factors influencing boat ridership is weather. The study advises that ashore weather departments be well-equipped with more sophisticated weather technology in order to send proper and accurate weather reports on time. This would increase the degree of confidence among prospective travelers in the study area. Supply of contemporary watercrafts (ferries) will entice more passengers to use ferry services, boasting economic interest of ferry operators (suppliers of ferry services. Furtherance to this, more water transport terminal/Interchange infrastructure (figure 3) should be provided for communities heavily dependent on water transport. As public discovers more benefits of ferry services, there is very high tendency that population of prospective passengers demanding for ferry service will increase.

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Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

Babatope Sunday Olisa carried out field studies and collaborated with Mobolaji Stephen Stephens, develop the procedures used in carrying out the field study.
Mobolaji Stephen, Stephens is the major supervisor of the study. He monitored and carried field records, statistics and computations Chiamaka Lovelyn Olisa assisted in typing and formatting the text. Also, she digitized administrative map of the study area using ArcGIS and Computer aided techniques.
In summary, everyone contributed in the present research, at all stages from the formulation of the problem to the final findings and solution.

Conflict of Interest
The authors have no conflicts of interest to declare that are relevant to the content of this article.